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**DISTRIBUTION AND BIOMASS OF SOME PERUVIAN PELAGIC RESOURCES. SUMMER 2005**

*Ramiro Castillo, Marceliano Segura, Salvador Peraltilla*

**ABSTRACT**

The studied species were: six fishes, one crustacean and one cephalopod: anchovy, horse mackerel, Pacific mackerel, vinciguerría, catfish, carrot lobster, and giant squid. The hydroacoustic assessment of pelagic resources RV Olaya and SNP2 0502-04 cruise was conducted from Tumbes to Tacna from February 20<sup>th</sup> to April 4<sup>th</sup> 2005. The IMARPE's method for these studies was used. The Peruvian anchovy (12,713,668 t) was the most abundant, greater than in former years. The carrot lobster (1,354,070 t) off Salaverry to Morro Sama. The Jack mackerel (139,315 t) and Pacific mackerel (252,658 t) were found mainly in the south, in water mixture. The vinciguerría (5,914,631 t), widely dispersed north of Salaverry and dense south of Huarmey. Catfish (110,082 t) in scattered and coastal concentrations. The camotillo was detected in very small and isolated area near to the coast from Punta La Negra and Ocoña. The giant squid (661,297 t) had larger aggregations between Cerro Azul and off Pimentel. Sardine, almost absent in the assessment area, was not considered in this report.

**OXYGEN, CHLOROPHYLL-A AND NUTRIENTS IN PERUVIAN SEA IN SUMMER 2005**

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**ABSTRACT**

The study was conducted during the Hydroacoustic Assessment of Pelagic Resources RV Olaya and SNP2 0502-04 cruise, from Puerto Pizarro (Tumbes) to Ilo (Moquegua). The concentration of dissolved oxygen in sea surface was high (>5 mL/L) due to the presence of the Subtropical Surface Water (SSW) and the processes of photosynthetic activity; in upwelling areas, concentrations were <4 mL/L associated with temperatures <19 °C. The values of surface chlorophyll-a ranged from 1.0 to 36 ug/L, the isoline of 1.0 ug/L delineated the areas of least biological productivity. Nutrients, mainly in the study area were characterized by phosphate concentrations <1.0 ug-at / L, and the silicate and nitrate were <5 ug-at/L.

**DISTRIBUTION AND BIOMASS OF SOME PERUVIAN PELAGIC RESOURCES IN SPRING 2005**

*Ramiro Castillo, Mariano Gutiérrez, Salvador Peraltilla, Marceliano Segura*

**ABSTRACT**

We studied eight species: anchovy, *Engraulis ringens*; horse mackerel, *Trachurus murphyi*; Pacific mackerel, *Scomber japonicus*; catfish, *Galeichthys peruvianus*; camotillo, *Normanichthys crockeri*;

vinciguerria, *Vinciguerria lucetia*; carrot lobster, *Pleuroncodes monodon* and giant squid, *Dosidicus gigas*. The cruise RV Olaya and SNP2 0511-12 was carried out from Paita (5°05'S) to Tambo de Mora (13°20'S), from November 25<sup>th</sup> to December 24<sup>th</sup>. The systematic sampling was used according to the methodology established by the IMARPE. The anchovy (5,896,374 t) was widely distributed until 70 nm on average away of the coast, with nuclei of high abundance in the north; between Huarmey and Tambo de Mora was found into 10 nm due to the strong interference of ASS. The mackerel (410,038 t), unlike in previous years, has increased its range and abundance. Pacific mackerel (15,936 t) coincided in some areas of horse mackerel, although with much lower abundance. Catfish (207,685 t) was limited to the area between Punta Falsa and Chérrepe, up to 15 nm on average. The vinciguerria (1,262,992 t) was distributed in surface salinities >35.2 psu, outside of the 70 nm between Paita and Lobos de Afuera islands; to the south was observed outside the 90 nm on average, although south of Callao its presence was weak. Giant squid (291,781 t) was widely distributed off Punta Falsa; to the south, in isolated nuclei out of the 50 nm offshore was found. The carrot lobster (1,380,952 t) was abundant, in the coastal zone had differences.

## **PERUVIAN SEA PHYSIC OCEANOGRAPHIC CHARACTERISTICS IN SPRING 2005**

*Enrique Tello*

### **ABSTRACT**

The RV Olaya and SNP2 0511-12 cruise, carried out from Paita (5°S) to Tambo de Mora (13°30'S), found that the physical oceanographic conditions showed the withdrawal of the 19 °C and 18 °C isotherms, within 50 nm off Chérrepe to Pucusana (7°S – 12°30'S), because the displacement of western warmer waters (20 and 21 °C) approached the coast off Punta Bermejo to Callao (10°30' – 12°S). Haline concentrations determined the presence, at north of 5°S, of equatorial surface waters (ESW) (34.5 to 34.8 psu) and subtropical surface waters (SSW) (35.1 to 35.3 psu) at greater length than during the winter cruise (0508-09) with projection to Punta Bermejo (15 nm) and Callao (25 nm). The mixed water areas were reduced south of Chimbote, to expand off Huacho and south of Cerro Azul, due to lower advance of SSW. Typical coastal upwelling waters associated with temperatures <18 °C, were recorded off Paita and Punta Falsa and <17 °C off Chicama to Callao.

## **DISTRIBUTION AND BIOMASS OF THE MAIN PELAGIC RESOURCES OF PERUVIAN SEA. SUMMER 2006**

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### **ABSTRACT**

This hydroacoustic evaluation of pelagic resources from Tumbes to Ilo was carried out by the RV Olaya and SNP2 0602-04 Cruise, from February 20<sup>th</sup> to April 4<sup>th</sup> 2006. The systematic sampling was used according to the methodology established by the IMARPE. The Peruvian anchovy was predominant in the coastal ecosystem, from Talara to Mollendo, with important concentrations in Punta La Negra and Bahía Independencia; all this area was smaller compared with that of 2005 and

2004 summer; their total biomass (8,014,877 t) had the biggest abundance in 6°S (Punta La Negra-Pimentel) and 10°S (Huarmey-Supe). The horse mackerel (724,912 t) and the Pacific mackerel (225,646 t) had almost similar distributions with an important nucleus in the south off Chala to Mollendo area associated with ASS. The vinciguerra (1,940,557 t) had a wide distribution from Punta Sal to Ilo, with main concentrations from Callao to Cerro Azul, detected until 490 m depth. The catfish (236,632 t) from Punta La Negra to Pisco, was continuous until Casma, and discontinues toward the south of Casma. The Camotillo sea bass (655 nm<sup>2</sup>; 92,741 t) occupied very sporadic areas near the coast (0 and 10 nm) among Supe and Chala. The samasa (740 nm<sup>2</sup> and 31,643 t) presented alone in very dispersed, isolated and coastal small nuclei between Paita and Tambo de Mora. The carrot lobster (1,080,545 t) in almost continuous form from Chicama until Mollendo, was coastal with high concentrations among Pisco-Bahía Independencia and Supe-Huacho, associated to ACF. The pota, or giant squid (844,520 t), was the most abundant resource in the oceanic area, with an almost similar distribution registered for vinciguerra in the areas of mixture of SSW, ESW and CCW.

## **MICROALGAE COMMUNITY DURING THE SUMMER 2006**

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### **ABSTRACT**

During the RV Olaya 0602-04 cruise, an overall average volume of plankton of 0.45 mL/m<sup>3</sup> was registered. The phytoplankton predominated in the nuclei off Puerto Pizarro (3.0 mL/m<sup>3</sup>), Atico to Quilca (2.0 mL/m<sup>3</sup>) and south of Punta Mendieta (1 mL/m<sup>3</sup>). Latitudinal most representative average volumes (>1 mL/m<sup>3</sup>) were located within 30 nm, between 3-4°S, 14-15°S and 16-17°S. The predominant phytoplankton in 33% of the coastal stations, was characterized by a dominance of diatoms over dinoflagellates, reflected by its higher relative abundance within 20 nm, from Puerto Pizarro to south of Punta Falsa, Chimbote to Callao and Punta Mendieta to Matarani. *Ceratium breve*, indicator of ESW, was distributed to the north of 6°S, situation normal for this time of year. *Protoperdinium obtusum*, an indicator of ACF, was restricted to the coastal zone, extending its distribution between Chimbote and Callao. *Ceratium praelongum*, ASS indicator, was located near Puerto Pizarro and south of Punta Gobernador out of 60 nm, in Punta Mendieta and San Juan was out of the 100 nm.

## **ENVIRONMENTAL CONDITIONS OF PERUVIAN SEA DURING SUMMER 2006**

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### **ABSTRACT**

The work was done in the Hydroacoustic research cruise of pelagic resources RV Olaya 0602-04, from February 20<sup>th</sup> to April 12<sup>th</sup>, 2006, from Puerto Pizarro to Punta Bombon. The marine environment was found very disturbed due mainly to changes in salinity. The thermal anomalies (SSTA) ranged from +4.3 to -2.0 °C outside 50 nm; positive ones predominated north of 6°S, in

conjunction with equatorial surface waters (ESW); and south 15°S, associated with subtropical surface waters (ASS). From Pucusana to Tambo de Mora, negative anomalies associated with tropical waters of the Subantarctic (TSAW). The winds showed intensities between 0.3 and 11.5 m/s, with predominant direction from SE to the NW. South of 12°S, the winds increased between San Juan and Atico, favoring coastal upwelling areas and the projection of relatively cold waters to the west. The subsurface layer presented a stronger thermocline, up to eight isotherms, typical of summer, with the rise of isotherms in the south, and strengthening of the Southern Extension of the Cromwell Current (ESCC) in the north. The presence of TSW and ESW suffered a weakening in the first half of March due mainly to the increase of Chilean Peruvian Counter Current (JPAC).

## **DISTRIBUTION AND ABUNDANCE OF PERUVIAN PELAGIC AND MESOPELAGIC SPECIES. SPRING 2006**

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### **ABSTRACT**

This hydroacoustical assessment was conducted during the RV Olaya and SNP2 0611-12 cruise, from Tacna to Tumbes, from November 5<sup>th</sup> to December 23<sup>rd</sup> 2006. The thermal distribution showed slightly warm conditions. Sea surface temperature (SST) ranged from 14.3 and 24.7°C. The SSW prevailed in most of the surveyed area. The CCW had their wider extent between Pucusana and Punta Caballas. The environmental conditions have not produced a noticeable alteration of their usual pattern of distribution for the season. In nine species, seven fishes and two invertebrates, the biomass, the distribution area and the commercial length (CL) percentage were observed. Anchovy biomass reached 6'501,704 t at 45,667 nm<sup>2</sup>, CL 15.83%. Carrot lobster or munida biomass reached 1'943,146 t at 22,317 nm<sup>2</sup>, CL 11.29%). Jumbo squid biomass reached 201,722 t at 47,880 nm<sup>2</sup>, CL 47.57%. Panama light fish biomass reached 5'300,272 t at 77,754 nm<sup>2</sup>, CL 4.95%. Jack mackerel biomass reached 149,873 t at 31,182 nm<sup>2</sup>, LC 32.75%. Camotillo sea bass biomass reached 17,123 t at 1,974 nm<sup>2</sup>, CL 61.93. Longnose anchovy biomass reached 82,376 t at 7,505 nm<sup>2</sup>, CL 38%. Catfish biomass reached 321,127 t at 6,036 nm<sup>2</sup>, CL 50.18%). Pacific mackerel biomass reached 5,568 t at 11,648 nm<sup>2</sup>, CL 31.24%.

## **ENVIRONMENTAL FLUCTUATIONS AND THE PERUVIAN ANCHOVETA DISTRIBUTION IN THE SUMMER 2007**

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### **ABSTRACT**

The used information corresponds to the acoustic and oceanographic data obtained in the RV Olaya an SNP2 0702-04 cruise for hydroacoustic evaluation of pelagic resources carried out from February 22<sup>nd</sup> to April 8<sup>th</sup> 2007. The analysis carried out corresponds to synoptic charts and data interpolation

by GAM analysis of echo integration values of anchovy by the oceanographic variables of salinity, temperature and oxygen. The oceanographic conditions found were normal for the summer season; the distribution anchovy was mainly coastal, with the biggest concentrations in the areas north and north-center. The anchovy presence was associated to CCW and mixture waters among CCW, ASS and/or ESW, with superficial salinity 34.8 to 35.2 ups, 18 and 22 °C and 3 to 6 mL/L dissolved oxygen. It was outstanding the presence of juveniles far off Paita, Chicama, Pisco and Atico-Quilca where these oceanographic variables had high values, what indicates that this species over time could be adapting to extreme conditions. According to satellite images, the anchovy occupied areas where SST varies from 19 to 21 °C, chlorophyll-a from 2.5 to 10 mg/m<sup>3</sup> and negative sea level anomaly (SLA) from -3 to -7 cm. In general, the Peruvian coast presents chlorophyll-a distribution fairly high; however, the anchovy was located preferably in areas where the chlorophyll-a was higher than 2.5 mg/m<sup>3</sup>; compared to the values found in SLA negative. Vertically, the anchovy was between the isohalines 34.9 to 35.2 ups, isotherms between 16 and 24 °C, and oxycline between 1 to 7 mL/L.

### **THE MAIN PELAGIC RESOURCES OF PERUVIAN SEA DURING SUMMER 2007**

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#### **ABSTRACT**

The cruise for hydroacoustic assessment of pelagic species RV Olaya and SNP2 0702-04, was carried out from Tacna to Tumbes, from February 22<sup>nd</sup> to April 8<sup>th</sup> 2007. We applied the method established by IMARPE to study nine species of resources, seven fish, one crustacean and one cephalopod. The anchovy, *Engraulis ringens* (8,259,036 t) continues as the dominant species in the coastal pelagic ecosystem, from Cabo Blanco to Morro Sama, it was most abundant between Talara (5°S) and Bahía Independencia (14°S), especially between 8 and 6°S, the tonnage was almost similar to summer 2006 (8,014,877 t); related to the distance from shore, 43.37% of the biomass was found between 1-10 nm; and between 10-20 nm, the 33.84%. The Jack mackerel, *Trachurus murphyi* (236,235 t) and Pacific mackerel, *Scomber japonicus* (164,252 t) maintain a minimum abundance after EN 1997-98. The vinciguerra, *Vinciguerra lucetia* (5,948,500 t) was widely distributed by the SSW approach to the coast. Catfish *Galeichthys peruvianus* (304,788 t) was located in the northern coastal area, always accompanied by other coastal species. In small areas were found the Camotillo sea bass *Normanichthys crockeri* in the south, and the longnose anchovy *Anchoa nasus* in the north. The carrot lobster *Pleuroncodes monodon* (2,105,325 t) was associated with the CCW, since Supe to Ilo (11 to 17°30'S), more abundant in front of Supe to Callao, and Bahía Independencia to Infernillos. The giant squid *Dosidicus gigas* (1,231,713 t) had widely scattered distribution characteristics, especially in offshore areas.